

## CLAIMS

What is claimed is:

1. A method comprising:
  - a) dividing a frequency range into a plurality of frequency bands of interest;
  - b) measuring a frequency of a voltage-controlled oscillator (VCO) for a plurality of capacitance value/voltage level combinations to obtain a set of capacitance values and a corresponding set of frequency values for a set of voltage levels;
  - c) selecting a capacitance value such that a corresponding frequency range covers the frequency band of interest, the corresponding frequency range determined by an output voltage of a digital-to-analog converter; and
  - d) repeating operation c) for each frequency band of interest.
2. The method of claim 1 further comprising:
  - e) determining a representative frequency for a frequency band;
  - f) estimating a VCO gain at the representative frequency;
  - g) selecting a charge pump current level for the frequency band, the charge pump current level based upon the VCO gain; and
  - h) repeating operations e) through g) for each frequency band of interest.
3. The method of claim 1, wherein the frequency range of the VCO is 2200MHz – 2600MHz.
4. The method of claim 1, wherein the plurality of frequency bands of interest comprises 6 frequency bands.
5. The method of claim 2, wherein the frequency range of interest is 2402MHz – 2480MHz.

2025-10-01 16:02

6. The method of claim 3, wherein the frequency bands of the VCO comprises 16 frequency bands.
7. The method of claim 2, wherein the VCO has a capacitance value set by a bank of switchable capacitors.
8. The method of claim 7, wherein the bank of switchable capacitors comprises four binary switch capacitors such that the capacitance value may be set to one of 16 capacitance values.
9. The method of claim 8, wherein the VCO has a voltage set by a controlled voltage source.
10. The method of claim 9, wherein the controlled voltage source is a digital-to-analog converter (DAC).
11. The method of claim 10, wherein the DAC has 7 output voltage levels, the output voltage levels ranging from approximately 1.0 volts to approximately 1.75 volts in 0.125 volt increments.
12. The method of claim 11, wherein the plurality of capacitance value/voltage level combinations comprises each of the 16 capacitance values combined with each of the 7 voltage levels.
13. The method of claim 2, wherein the representative frequency is determined through empirical data.
14. The method of claim 2, wherein the charge pump current level is selected from a plurality of charge pump current levels.
15. The method of claim 14, wherein the plurality of charge pump current levels are provided through a set of switchable current meters.

16. A machine-readable medium containing instructions which, when executed by a processor, cause the processor to perform a method, the method comprising:

- a) dividing a frequency range into a plurality of frequency bands of interest;
- b) measuring a frequency of a voltage-controlled oscillator (VCO) for a plurality of capacitance value/voltage level combinations to obtain a set of capacitance values and a corresponding set of frequency values for a set of voltage levels;
- c) selecting a capacitance value such that a corresponding frequency range covers the frequency band of interest, the corresponding frequency range determined by an output voltage of digital-to-analog converter; and
- d) repeating operation c) for each frequency band.

17. The machine-readable medium of claim 16 further comprising:

- e) determining a representative frequency for a frequency band of interest;
- f) estimating a VCO gain at the representative frequency;
- g) selecting a charge pump current level for the frequency band, the charge pump current level based upon the VCO gain; and
- h) repeating operations e) through g) for each frequency band.

18. The machine-readable medium of claim 16, wherein the frequency range of a VCO is 2200MHz – 2600MHz.

19. The machine-readable medium of claim 16, wherein the plurality of frequency bands of interest comprises 6 frequency bands.

20. The machine-readable medium of claim 17, wherein the frequency range of interest is 2402MHz – 2480MHz.

21. The machine-readable medium of claim 18, wherein the frequency range of VCO comprises 16 frequency bands.

22. The machine-readable medium of claim 17, wherein the VCO has a capacitance value set by a bank of switchable capacitors.
23. The machine-readable medium of claim 22, wherein the bank of switchable capacitors comprises four binary switch capacitors such that the capacitance value may be set to one of 16 capacitance values.
24. The machine-readable medium of claim 23, wherein the VCO has a voltage set by a controlled voltage source.
25. The machine-readable medium of claim 24, wherein the controlled voltage source is a digital-to-analog converter (DAC).
26. The machine-readable medium of claim 25, wherein the DAC has 7 output voltage levels, the output voltage levels ranging from approximately 1.0 volts to approximately 1.75 volts in 0.125 volt increments.
27. The machine-readable medium of claim 26, wherein the plurality of capacitance value/voltage level combinations comprises each of the 16 capacitance values combined with each of the 7 voltage levels.
28. The machine-readable medium of claim 27, wherein the representative frequency is determined through empirical data.
29. The machine-readable medium of claim 28, wherein the charge pump current level is selected from a plurality of charge pump current levels.
30. The machine-readable medium of claim 29, wherein the plurality of charge pump current levels are provided through a set of switchable current meters.

31. A system comprising:

a phase-locked loop (PLL) circuit, the PLL circuit including a) a VCO circuit, the VCO circuit having a plurality of switchable capacitors to set the VCO circuit capacitance value, the VCO circuit having a controlled voltage source, b) a charge pump, having a plurality of switchable current meters to set the charge pump current level;

a central processing unit;

a memory device coupled to the central processing unit, the memory having stored therein instructions which, when executed by the central processing unit, cause the central processing unit to

a) divide a frequency range into a plurality of frequency bands of interest;

b) measure a frequency of the voltage-controlled oscillator (VCO) for a plurality of capacitance value/voltage level combinations to obtain a set of capacitance values and a corresponding set of frequency values for a set of voltage levels;

c) select a capacitance value such that a corresponding frequency range covers the frequency band of interest, the corresponding frequency range determined by an output voltage of a digital-to-analog converter; and

d) repeat operation c) for each frequency band.

e) determine a representative frequency for a frequency band:

f) estimate a VCO gain at the representative frequency;

g) select a charge pump current level for the frequency band, the charge pump current level based upon the VCO gain; and

h) repeating operations e) through g) for each frequency band.

32. The system of claim 31, wherein the frequency range is 2402MHz – 2480MHz.
33. The system of claim 31, wherein the plurality of frequency bands of interest comprises 6 frequency bands.
34. The system of claim 31, wherein the bank of switchable capacitors comprises four binary switch capacitors such that the capacitance value may be set to one of 16 capacitance values.
35. The system of claim 31, wherein the controlled voltage source is a digital-to-analog converter (DAC), the DAC having 7 output voltage levels, the output voltage levels ranging from approximately 1.0 volts to approximately 1.75 volts in 0.125 volt increments.
36. The system of claim 35, wherein the plurality of capacitance value/voltage level combinations comprises each of the 16 capacitance values combined with each of the 7 voltage levels.
37. The system of claim 31, wherein the representative frequency is determined through empirical data.